

Collaboration between ISHS, GHI and the World Vegetable Center in response to world poverty and malnutrition and the role of moringa as a nutrient rich food

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Abstract

We live in a world where poverty and malnutrition are major problems in many countries. Poverty is a major cause of malnutrition. The World Bank states that more than 2.1 billion people in the developing world lived on less than US \$ 3.10 a day in 2012. The Global Horticulture Initiative (GHI) estimates that two billion people are micro-nutrient deficient, one billion people are overweight or obese and 805 million are chronically undernourished and suffer from energy-protein deficiency. It behooves us who live in wealthy circumstances to help our fellow human beings who are suffering. Much of the funding that goes to international aid agencies is committed to work on dietary staple crops and recently there has been a trend to fund research on biofortification of staple crops. There is tendency to disregard horticultural crops that can provide a wide range of micro-nutrients, vitamins, anti-oxidants, diversity, medicines and income. High value horticultural crops can yield an income on small farms and help alleviate poverty. The World Vegetable Center has made considerable progress in fostering production and use of vegetables in many poor countries. Moringa has a relative advantage as it provides the high levels of protein that are provided by staple crops; the high levels of nutrients and vitamins of vegetables; and, two amino acids (arginine and histidine) that are especially important for infants. In addition, moringa has a long history of medicinal uses. It grows quickly and research at the World Vegetable Center has demonstrated efficient high yielding production systems, ways it can be consumed as a vegetable, and the impact that it can have in alleviating poverty and malnutrition. The International Society for Horticultural Science (ISHS) is a very active society and has members in over 140 countries. ISHS has collaborative agreements with both GHI and the World Vegetable Center, and this symposium is one example of our collaboration as a group of international bodies to promote the use of a high value and highly nutritious food crop that has the potential to help address the pressing problems of poverty and malnutrition.

Keywords: horticulture, hidden hunger, vegetables, vitamins

INTRODUCTION

We live in a world where poverty and malnutrition are major problems in many countries. Poverty is a major cause of malnutrition. This overview reviews the role of moringa as a nutrient dense food and collaboration between the International Society for Horticultural Science (ISHS), the Global Horticulture Initiative (GHI) and the World Vegetable Center in response to world poverty and malnutrition.

Recently, ISHS has signed collaborative agreements with GHI and the World Vegetable Center to work together to alleviate poverty and malnutrition worldwide. This first international symposium on moringa is an example on how international bodies and delegates from around the world can work together to promote the use of a high value and highly nutritious horticultural crop. Horticulture and horticultural science are global issues.

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There is an escalating need for sustainable production of agricultural and horticultural crops to feed an ever-increasing world population. It was estimated by the Food and Agriculture Organization of the United Nations that by 2050, nine billion people will live in a world (FAO, 2009) with an ever-increasing proportion in cities.

No matter what your cultural diversity, we all need horticultural crops as part of a diverse and essential diet. Horticulture is a major component of world economies and employs countless millions of people worldwide. The diversity of horticultural species brings us color and quality of life and helps sustain our environment. The therapeutic and medicinal benefits of horticultural species have been known for thousands of years, particularly in Asian countries and are becoming more relevant in the busy and stressful lives of many people. Thus the growing importance of horticulture is apparent to all people in all walks of life. International organizations such as ISHS, the World Vegetable Center and GHI provide the networks for communication, and promote the benefits of horticultural products and their potential to meet the increasing needs of our worldwide community.

INTERNATIONAL SOCIETY FOR HORTICULTURAL SCIENCE

The International Society for Horticultural Science was officially registered on April 27, 1959. The aim of the ISHS is "...to promote and encourage research and education in all branches of horticultural science and to facilitate cooperation and knowledge transfer on a global scale through its symposia and congresses, publications and scientific structure." (ISHS, 2016). ISHS continues to be the focal point for all who are interested in horticulture and the most sought-after and acknowledged source of published material in this field. ISHS is an important network for all horticulturists and includes members from 150 countries. ISHS members with specific interests communicate through membership of nine crop-related sections, 14 discipline-related commissions and the 140 working groups they comprise (ISHS, 2016).

ISHS has a wide range of horticultural publications. *Acta Horticulturae* is a peer reviewed series of oral and poster presentations of all ISHS symposia and congresses. *Chronica Horticulturae* is a quarterly magazine that is sent to all ISHS members and *Scripta horticulturae* comprises a series of monographs covering various topics about horticultural crops. eJHS is the first peer-reviewed journal published by the ISHS and members can publish articles at a discounted rate (ISHS, 2016).

GLOBAL HORTICULTURE INITIATIVE

The Global Horticulture Initiative was established as a consortium to overcome constraints that limit the application of horticulture in developing countries. These included the lack of financial resources and commitment for research and development in horticulture; the lack of adequate innovation generation and dissemination systems; and the lack of an enabling environment, in particular social, economic, and political awareness and commitment. The mission of GHI is to improve human health and wellbeing and to create employment and wealth through increased production, processing, marketing, and consumption of fruits and vegetables and other horticultural crops with a special focus on smallholder farmers and poor households (GHI, 2016).

World poverty and malnutrition

GHI estimates that in the world there are more than 800 million chronically undernourished people suffering from energy-protein deficiencies; two billion people micronutrient deficient people; and one billion overweight or obese people. The severe micronutrient deficiency or hidden hunger is often neglected although thousands of children die every day from vitamin and nutrient deficiencies. The World Bank states that "Over 2.1 billion people in the developing world lived on less than US \$ 3.10 a day in 2012" (The World Bank, 2016). In 2015, UNICEF, WHO and The World Bank (2015) provided estimates on child malnutrition indicators (stunting, wasting, severe wasting, overweight and underweight). They state that worldwide, 159 million children are stunted, 50 million children are wasted and 41 million children are overweight. They estimated that 5.9 million children (more than

16,000 a day) under the age of 5 died in 2015. UNICEF reports that nearly half of all deaths in children under the age of five are caused by undernutrition (UNICEF, 2016).

Much of the funding that goes to international aid agencies is committed to work on dietary staple crops and recently there has been a trend to fund research on biofortification of staple crops. The funding spent on staple crops is commendable and given the current state of poverty and malnutrition in the world, much more funding is needed. However, there is a tendency to disregard horticultural crops that can provide a wide range of micro-nutrients, vitamins, anti-oxidants, diversity, medicines and income.

Crop and diet diversification is a better and more achievable approach to addressing hidden hunger than bio-fortification of staple crops. This has been demonstrated by the World Vegetable Center who have alleviated problems caused by malnutrition in many countries by encouraging poor people to grow and consume vegetables. In many cases they have successfully promoted the consumption of indigenous vegetables such as moringa, slippery cabbage (*Abelmoschus manihot*), amaranth (*Amaranthus* spp.), jute mallow (*Corchorus olitorius*), vegetable cowpea (*Vigna unguiculata*) and bitter melon (*Momordica charantia*). All of these are much higher in micronutrient and vitamin content than our traditional vegetables that are eaten in developed countries.

Role of moringa as a nutrient rich food

Moringa spp. have been used as food crops and as medicinal plants for thousands of years, dating back to the Roman Empire. Their leaves and seed pods can be used as a highly nutritious vegetable. They are quick growing trees that produce large quantities of biomass in a relatively short period of time when compared to other tree species. Research at the World Vegetable Center has demonstrated efficient high yielding production systems for *Moringa oleifera*, ways it can be consumed as a vegetable, and the impact that it can have in alleviating poverty and malnutrition. Moringa has a relative advantage over other food plants as it provides the high levels of protein that are provided by staple crops; the high levels of nutrients and vitamins of vegetables; and, two amino acids (arginine and histidine) that are especially important for infants (Seshadri and Nambiar, 2003; Palada, pers. commun.).

Moringa leaves have been reported to be a rich source of β -carotene, protein, vitamin C, iron, calcium and potassium and are a good source of natural antioxidants such as ascorbic acid, flavonoids, carotenoids and phenolics substances (Chawla et al., 1988; Makkar and Becker, 1996; Siddhuraju and Becker, 2003). In the Philippines, moringa is known as 'mother's best friend' because it is used to increase the volume of breast milk produced by nursing mothers (Estrella et al., 2000). It has been used as a medicinal plant as it has anti-inflammatory and anti-microbial activities and it has been used to treat cardiovascular, gastrointestinal and hematological disorders (Cáceres et al., 1991, 1992; Siddhuraju and Becker, 2003; Mahajan et al., 2007). Another advantage of *Moringa* spp. is that these are indigenous vegetables that can be grown in a wide range of climates. In a world that is increasingly aware of the many who are undernourished and malnourished, moringa has a significant role to play. As horticulturists, we need to work together to realize the potential of this crop to meet the needs of our world.

CONCLUSIONS

In the 20th century, agriculture in the form of the green revolution fed the world with increased protein and carbohydrates from high yielding cultivars of dietary staple crops. In the 21st century, biofortification is seen by many funding agencies as the way to address malnutrition. We must address hidden hunger which in our era affects 2.5 times more people than energy/protein deficiencies. Horticulture provides variety, quality, nutrients and vitamins, plus value adding and income. Crop and diet diversification is a better and more achievable approach to addressing hidden hunger than biofortification of staple crops. Thus for every \$ 1 we are spending on staple crops, \$ 2.50 should be spent on horticultural crops. Moringa is a highly nutritious food crop that has the potential to help address the pressing problems of poverty and malnutrition.



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